# Project Two Summary Report

## Introduction: Problem Statement

Nowadays almost every team in NBA has at least has one data analyst whose job is to analyze the team performance in previous games. Almost every decision in NBA games is now based on analytics. In this project, it was required to choose any team and do analysis on its performance over the years using statistics techniques. The dataset used for this analysis is FiveThirtyEight NBA Elo dataset. There are four important variables in data set that you have been used to carry out analysis. These variables are:

Table 1: Data Variables

|  |  |
| --- | --- |
| **Variable** | **What does it represent?** |
| pts | Points scored by the team in a game |
| elo\_n | A measure of the relative skill level of the team in the league |
| year\_id | Year when the team played the games |
| fran\_id | Name of the NBA team |

Hypothesis testing was used to test claims made by manager of knicks manager. In first hypothesis testing we will check whether the average skill of knicks is less or greater than 1420. The second hypothesis testing tells us that whether the average points scored by knicks between 2013 and 2015 is greater than or less 110. The third test will show whether 50% of time the team has scored 80 points. In the last test we see whether the average relative skill of knicks and bulls is equal or not.

## Introduction: Your Team and the Assigned Team

The table 2 below shows selected team and assigned team for the analysis in this project.

Table 2. Information on the Teams

|  | **Name of Team** | **Assigned Years** |
| --- | --- | --- |
| 1. Yours | Knicks | 2013 - 2015 |
| 2. Assigned | Bulls | 1996 – 1998 |

## Hypothesis Test for the Population Mean (I)

We assume that the null hypothesis is that the average relative skill of Knicks from year 2013 to 2015 is less than 1420 and the alternative hypothesis is that the average relative skill of Knicks is greater than 1420. Mathematically it can be shown as.

**H0:** µ <= 1420

**H1:** µ > 1420

Mean Relative Skill of your team in the years 2013 to 2015 = 1471.29

Hypothesis Test for the Population Mean

Test Statistic = 1.23

P-value = 0.2206

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | 7.26 |
| P-value | 0.0 |

The first hypothesized skill level of 1420 points-per-game (significantly low) at a 5% level of significance result shows that the Knicks has a mean relative skill of 1471.29.

The population mean of the test statistics is 7.26 and has a p-value of 0.0 which dismisses the null hypothesis (right-tailed) that was initially presented by the management team. These results signify that the data has a 95% confidence level and that the claim should be rejected. A fair assumption of the alternate hypothesis (left-tailed) would be that the mean relative skill for the Knicks is more than 1420 and should be accepted.

## Hypothesis Test for the Population Mean (II)

We assume that the null hypothesis is that the average points of knicks is less than and equal to 110 and the alternative hypothesis is that the average points of team is greater than 110. Mathematically it can be shown as.

**H0:** µ <= 110

**H1:** µ > 110

Mean Points of your team in the years 2013 to 2015 = 96.81

Hypothesis Test for the Population Mean

Test Statistic = -18.43

P-value = 0.0

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | -18.43 |
| P-value | 0.0 |

The second hypothesized skill level of 110 points-per-game (average) at a 1% (0.01) level of significance result shows that the Knicks has a mean relative skill of 96.81. The population mean test statistics is -18.43 and has a p-value of 0.0 (less than alpha of 0.01) which validates the null hypothesis (left-tailed) that was initially presented by the management team. These results signify

that the data has a 95% confidence level and that the claim should be accepted. Again, the

alternate hypothesis (right tailed) would be that the average points for the Knicks is more

than 110 and should be rejected.

## Hypothesis Test for the Population Proportion

The management claims that the proportion of games that Knicks wins when scoring 80 or more points is 0.50. We assume that the null hypothesis is proportion of wins is not equal 0.5 and alternative hypothesis is that the proportion of wins is 0.5.

**H0:** = number of wins(W) ≠ 0.50

**H1:** = number of wins (W) = 0.50

Proportion of games won by your team when scoring more than 80 points in the years 2013 to 2015 = 0.46

Hypothesis Test for the Population Proportion

Test Statistic = -0.93

P-value = 0.35

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | -0.93 |
| P-value | 0.35 |

Management claims that the Knicks team had at least 50% (0.50) games with scores of 80 or more points. Calculating the comprised population of the games won/lost, the use of a z-test statistic will analyze the data at a significance level of 5% (0.05) to further validate the null hypothesis. The results show that the team only won a proportion of 46% (0.46) of the games played and not 50%. The p-value is 0.3529 which is more than the alpha of 0.05 rejecting the alternate hypothesis.

## Hypothesis Test for the Difference Between Two Population Means

**H0:** = Knicks Relative Skill Level = Bulls eln\_n (Relative Skill Level)

**H1:** = Knicks (Relative Skill Level) ≠ Bulls eln\_n (Relative Skill Level)

Mean Relative Skill of the assigned team in the years 1996 to 1998 = 1739.8

Mean Relative Skill of your team in the years 2013 to 2015 = 1471.29

Hypothesis Test for the Difference Between Two Population Means

Test Statistic = 34.45

P-value = 0.0

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | 34.45 |
| P-value | 0.0 |

When calculating the comparative data between the two population means for relative skills of both the Knicks (1471.29) and the Bulls (1739.8) for the given timeframe at a 1% level of significance, the findings reject the null hypothesis at a 99% confidence interval, respectively. The test statistics is 34.45 and the p-value of 0.0 confirms that the null hypothesis should be rejected because it is less than the alpha of 0.01.

## Conclusion

In this project hypothesis testing was done on claims made by manager of Knicks team. The first claim was that either the average relative skill of team from year 2013 to 2015 is greater 1420 or not, after hypothesis testing it turned out that the average relative skill of knicks was greater than 1420. The second claim was that the average points of team scored between year 2013 to 2015 is less than 110, it turned out that average points were less than 110. The third results shows that it is not true that team has scored 80 points in 50% games. The Last test was Hypothesis Test for the Difference Between Two Population Means of average relative skill of knicks and bulls, it turned out that their average relative skill was not equal.